SECTION 16

Repair: Compressor Pedestal Assembly

The optional compressor can either provide the main source of compressed air or act as a back-up if facility wall air is lost. A pedestal, which contains the air compressor and also serves as a support stand for the ventilator, includes casters for movability.

This section includes removal, installation, testing, and adjustment procedures. Before repairing the compressor pedestal assembly, familiarize yourself with the warnings, cautions, and general repair instructions in Section 8.

Warning

- To prevent personal injury and equipment or property damage, ensure that electrical power sources and pneumatic sources are disconnected from the ventilator before servicing.
- Never attempt to push or pull a ventilator installed on a pedestal or cart while the brakes are set on the casters.
- Always make sure the brakes are set on the casters to prevent inadvertent movement of the ventilator during repair.
- To avoid personal injury or property damage, use two or more people to tilt or lift ventilator.

16.1 Pedestal Access Panel Cover and Inner Access Panel

Remove pedestal access panel cover and inner pedestal access panel as follows, referring to Figure 16-1. Install by reversing removal procedures.

1. Grasp L-shaped hose holders, if present, or top corners of pedestal access cover, and pull outward until ball studs snap out of retainers at both corners.
2. Remove cover by pulling it up and out from bottom.
3. Remove inner pedestal access panel by removing 8 (current versions) or 12 (earlier versions) screws and washers.

16.2 Compressor Fan Filter

The compressor fan filter prevents dust and debris from entering the compressor compartment. Clean the filter every 250 hours of compressor operation or more often if necessary. (Some environments cause a quicker collection of lint and dust.)

Remove the filter as follows, referring to Figure 16-1.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Remove filter by sliding it out of compressor compartment.
3. Vacuum filter or wash in mild detergent and water solution, rinse well, and dry thoroughly.
4. Install by reversing removal procedures, making sure arrow points into pedestal.

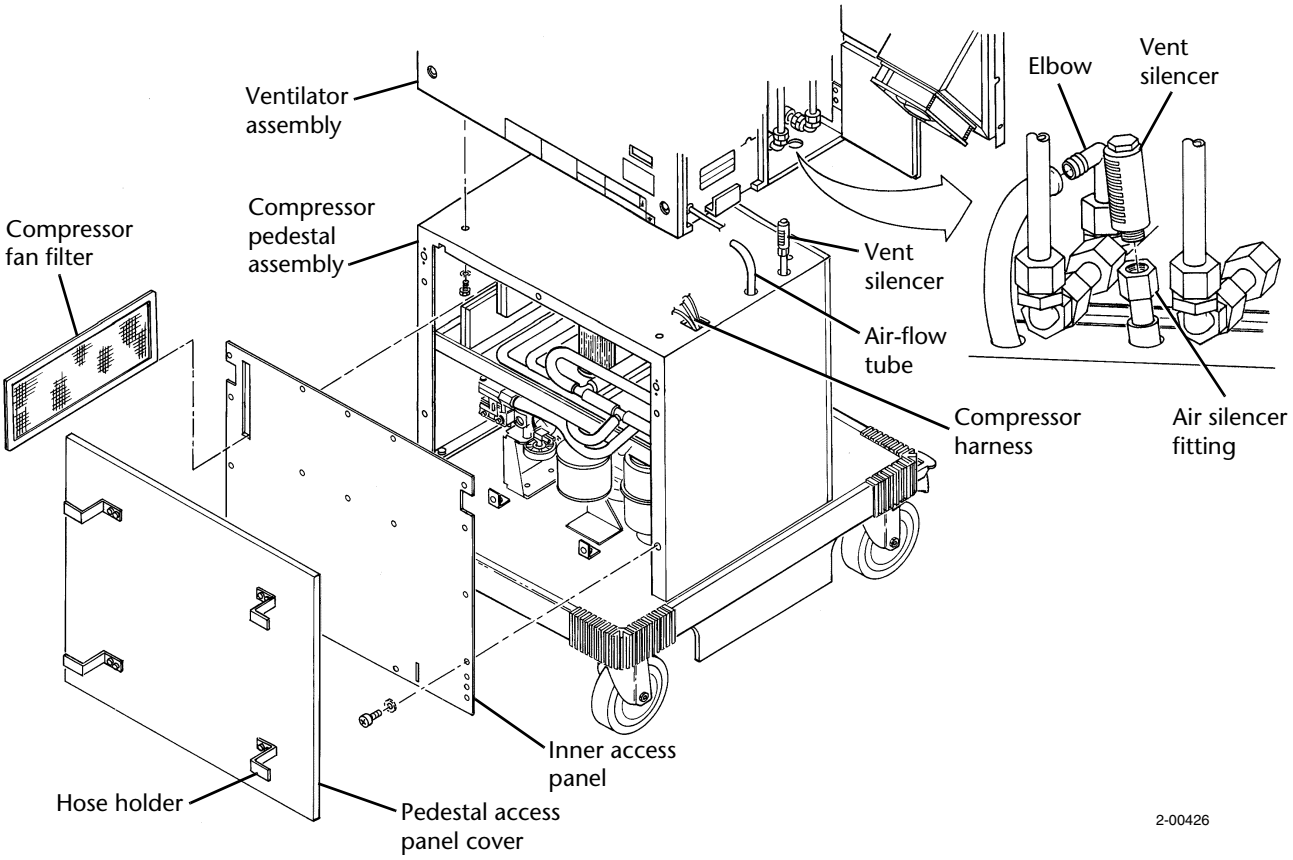


Figure 16-1. Removing Compressor Compartment Cover Access Panels and Air Compressor Filter

16.3 Compressor Inlet Filter (F5)

The compressor inlet filter (F5) prevents dust and debris from entering the compressor. Replace F5 every 2,500 hours of compressor operation; it is included in the 2,500-hour preventive maintenance kit. Remove F5 as follows, referring to Figure 16-2.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Disconnect flex tube from top of silencer.
3. Pull F5 up and out.
4. Cut strap and separate F5 from tube.
5. Install by reversing removal procedures, using new strap.

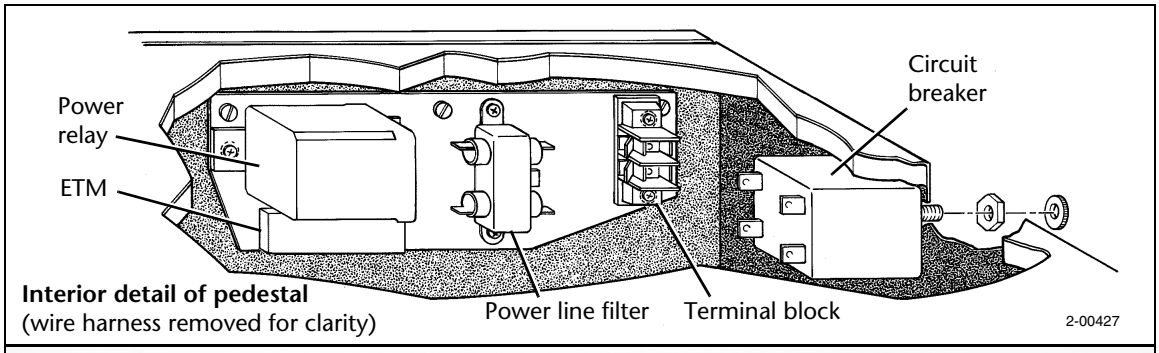
16.4 Compressor Circuit Breaker

The compressor circuit breaker protects the electrical components of the compressor pedestal assembly.

NOTE:
Always replace the power line filter and the circuit breaker whenever you replace the power relay.

Remove the circuit breaker as follows, referring to Figure 16-2. Install by reversing removal procedures.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Disconnect wiring harness from circuit breaker.
3. Remove circuit breaker by removing its mounting nut.



Interior detail of pedestal
(wire harness removed for clarity)

Figure 16-2. Compressor Compartment Viewed from Rear

16.5 Compressor Power Relay

The compressor power relay, under control of air pressure switch PS2 in the pneumatic chassis, applies ac power to the compressor pedestal assembly.

NOTE:

Later and earlier versions of the power relay differ in their terminal configurations, as shown in Figure 16-3. If the wires are misconnected, the circuit breaker may trip.

16.5.1 Testing

Test the power relay using a DMM as follows:

1. Turn off ventilator power. Disconnect wall air.
2. Remove pedestal access panel cover and inner access panel (16.1).
3. Turn on ventilator power.

Caution

Always use insulated test leads to avoid shorting pins.

4. Check relay voltage between pins 4 and 6 (or 3 and 4) (Figure 16-3). Verify that measured voltage matches ventilator input voltage (for example, 100, 115, 220, or 240 V).
5. Check relay voltage between pins 7 and 9 (or 5 and 6). Verify that measured voltage matches ventilator input voltage.
6. Measure between relay pins A and B, and verify that voltage measures +12 V.
7. Replace relay if any of the voltages are incorrect, referring to Section 16.5.2; otherwise, remove DMM and install pedestal access panel cover and inner access panel.

NOTE:

Always replace the power line filter whenever you replace the power relay.

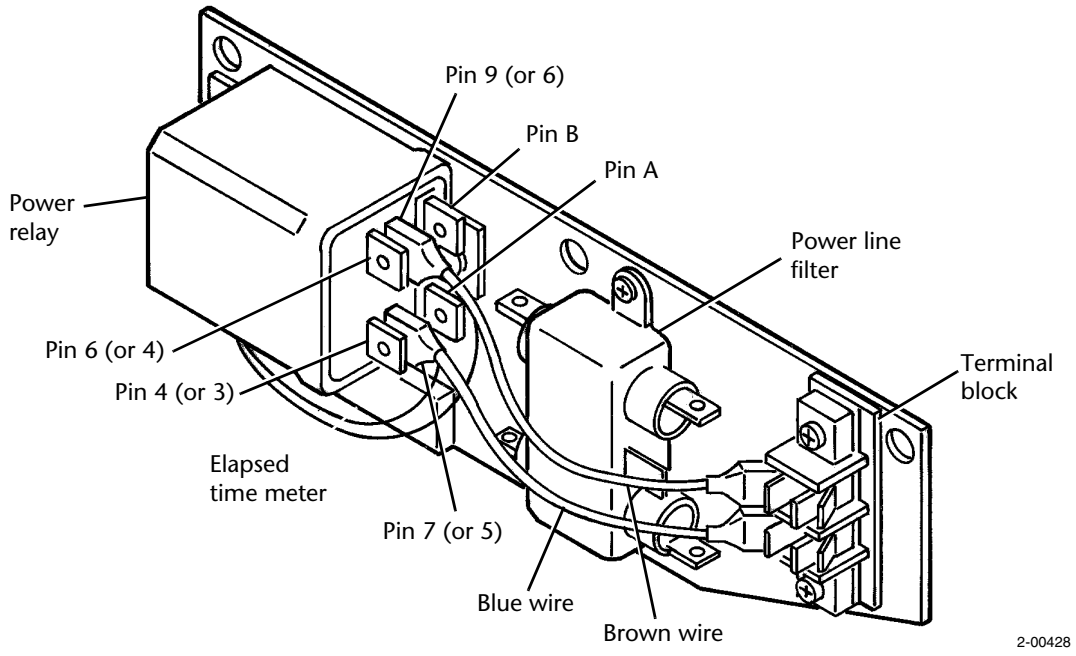


Figure 16-3. Compressor Compartment ac Components

16.5.2 Removal/Installation

Remove the power relay as follows, referring to Figure 16-2 and Figure 16-3. Install by reversing removal procedures.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Disconnect wiring from power relay.
3. Separate power relay from plate by removing two screws and washers.

16.6 Compressor Power Line Filter

The compressor power line filter filters ac power from the utility panel.

NOTE:
Always replace the power line filter whenever you replace the power relay.

Remove the power line filter as follows, referring to Figure 16-2 and Figure 16-3. Install by reversing removal procedures.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Disconnect wiring from power line filter.
3. Separate power line filter from mounting plate by removing two screws and two washers.

16.7 Compressor Elapsed Time Meter

The compressor elapsed time meter (ETM) measures the hours that the compressor operates. Replace the elapsed time meter whenever you replace the compressor; it is included in the 10,000-hour preventive maintenance kit. Remove the elapsed time meter as follows, referring to Figure 16-2 and Figure 16-3.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Disconnect elapsed time meter wiring:
   a. Disconnect brown wire that runs from pin 6 (or 9) of relay to terminal block.
   b. Disconnect blue wire that runs from pin 5 (or 7) of relay to terminal block. (These wires are also connected to the elapsed time meter.)
3. Pry time meter from relay mounting plate. Scrape (Section 8) any adhesive tape from plate.
4. Install elapsed time meter by reversing removal procedures, using the adhesive tape on the new time meter to fasten it to the plate. Make sure elapsed time meter is properly oriented. Reconnect wiring.

16.8 Compressor Back Pressure Regulator (REG3)

The compressor back pressure regulator (REG3) maintains a constant compressor output pressure of between 10 and 11 psi (68.95 to 75.85 kPa). REG3 relieves pressure as necessary to maintain this steady output pressure throughout the flow range of up to 120 lpm.

NOTE:
The compressor pressure switch (PS3) may be adjusted and tested in conjunction with REG3; refer to Section 16.9.

16.8.1 Testing Outlet Pressure

Test the outlet pressure of REG3 using a calibrated pressure measurement device, as follows:

1. Turn off ventilator power.
2. Disconnect wall air from the ventilator.
3. Select a pressure measurement range for 0 - 20 psi.
4. Connect ventilator NEBULIZER connector to the positive port on the pressure measurement device.
5. Make these ventilator control settings:

Control	Setting
Power	On
<NEBULIZER>	On
Mode	<CMV>
Waveform	Square
<TIDAL VOLUME>	2.5 liters
<RESPIRATORY RATE>	5 bpm
<PEAK INSPIRATORY FLOW>	40 Lpm
<SENSITIVITY>	20 cmH_2O
<O_2%>	21%
<HIGH PRESSURE LIMIT>	60 cmH_2O
All other controls	Minimum or off

6. Verify that pressure measurement device reads between 9.9 and 11 psi (68.95 and 75.85 kPa) during inspiration. If reading is outside range, adjust regulator as described in Section 16.8.3.

16.8.2 Removal/Installation

Remove REG3 as follows, referring to Figure 16-2.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Disconnect extruded tubing from REG3 regulator.
3. Disconnect wiring from PS3 and SOL9.

4. Remove REG3 assembly (with mounting bracket) by removing mounting screws, lockwasher, and washers.
5. Unscrew two elbow connectors from REG3.
6. Unscrew and remove nipple with SOL9 attached from REG3.
7. Unscrew and remove nipple with elbow and PS3 attached from REG3.
8. Separate REG3 from bracket by removing two bolts and washers.

Install by reversing removal procedures, making sure to replace any Teflon® tape on threaded pneumatic connections to prevent air leakage. Before returning ventilator to use, adjust REG3 (Section 16.8.3).

16.8.3 Adjustment

Adjust REG3 whenever the compressor output pressure falls outside the range 9.9 to 11 psi (68.95 to 75.85 kPa). The following allows REG3 to be adjusted without removing the pneumatic chassis (Figure 16-4).

1. Turn off ventilator power.
2. Remove pedestal access panel cover and inner access panel (Section 16.1).
3. Select a pressure measurement setting for 0-20 psi.
4. Remove tube from inlet side of REG3, and connect it to the positive port on the pressure measurement device.

NOTE:
If ventilator goes into apnea ventilation during adjustment, press <ALARM RESET>.

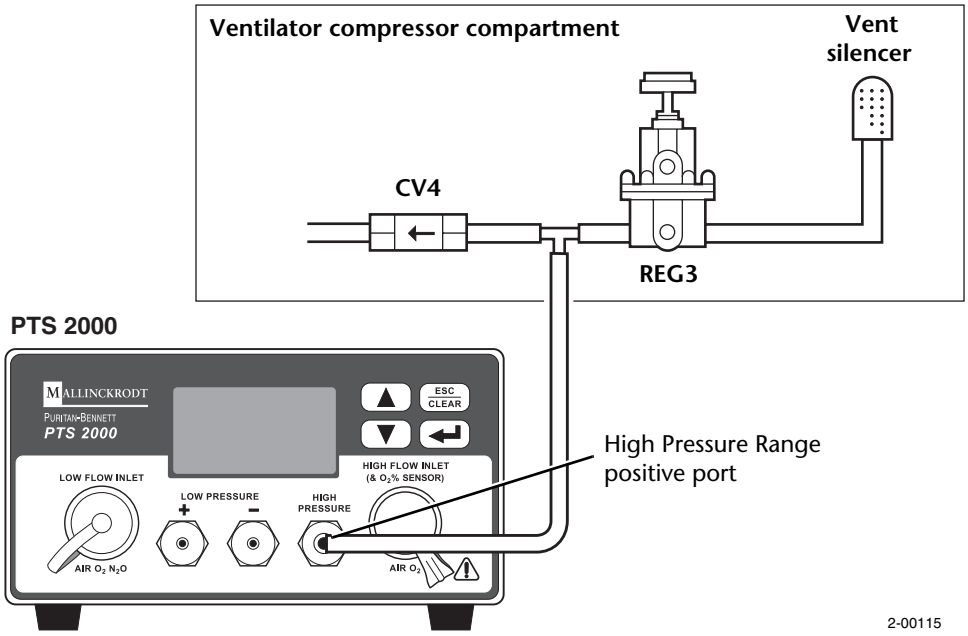


Figure 16-4. REG3 Adjustment Setup

5. Disconnect electrical connector from SOL9.

6. Turn on ventilator power, and make these control settings.

Control	Setting
<PEEP/CPAP> control	Off
Mode	<CPAP>
<SENSITIVITY>	20 cmH_2O
<O_2%>	21%
Apnea interval	60 seconds

7. Verify that pressure measurement device reads between 9.9 and 11 psi (68.95 and 75.85 kPa) during inspiration.
   - If reading is outside range, loosen REG3 locknut and adjust shaft until reading is in range. After making adjustment, hold adjustment shaft steady and tighten locknut, being sure that shaft does not turn.
   - If REG3 fails to meet output pressure requirements after adjustment, replace REG3 (Section 16.8.2).
8. Turn off ventilator power. Remove test equipment, restore ventilator pneumatics to original configuration, and reconnect SOL9.
9. Reinstall pedestal access panel cover and inner access panel.

16.9 Compressor Pressure Switch (PS3)

The compressor pressure switch (PS3) monitors the compressor outlet pressure downstream from F6. If the compressor output drops below 7.5 psi (51.71 kPa) nominal, PS3's contacts open to signal compressor failure.

16.9.1 Testing PS3 and REG3

NOTE:
If ventilator goes into apnea ventilation during this test, press <ALARM RESET>.

Test using a calibrated pressure measurement device, as follows.

1. Turn off ventilator power. Unplug power cord.
2. Disconnect wall air and oxygen, if applicable.
3. Remove pedestal access panel cover and inner access panel (Section 16.1).
4. Disconnect wires from SOL9.
5. Set up for pressure test, as shown in Figure 16-5.
6. Connect electrical power to power. Turn on ventilator.

7. Make these ventilator control settings:

Control	Setting
<PEEP/CPAP> control	Off
Mode	<CPAP>
<SENSITIVITY>	20 cmH_2O
<O_2%>	21%
Apnea interval	60 seconds

   Slowly release crimp so that a leak is created. Verify that pressure drops slowly.

8. Verify that a Safety Valve Open (SVO) condition occurs at a pressure of 7 to 8 psig (48.06 to 54.92 kPa). If SVO condition does not occur, adjust PS3 and retest.
9. Tighten crimp, observing a pressure increase on pressure measurement device. Verify that SVO condition is cancelled at a pressure no greater than 9 psig (62.06 kPa). If test fails, adjust PS3 and retest.
10. Block tube that was previously crimped. Allow pressure measurement device reading to stabilize. Verify that pressure measurement device reads between 9.9 and 11 psig (68.95 and 75.85 kPa). If pressure is out of range, adjust REG3 and retest.
11. Turn off ventilator power. Unplug power cord.
12. Remove test equipment, restore ventilator pneumatics to original configuration, and reconnect SOL9.

NOTE:
If PS3 cannot be adjusted, replace it (Section 16.9.2).

13. Reinstall pedestal access panel cover and inner access panel.

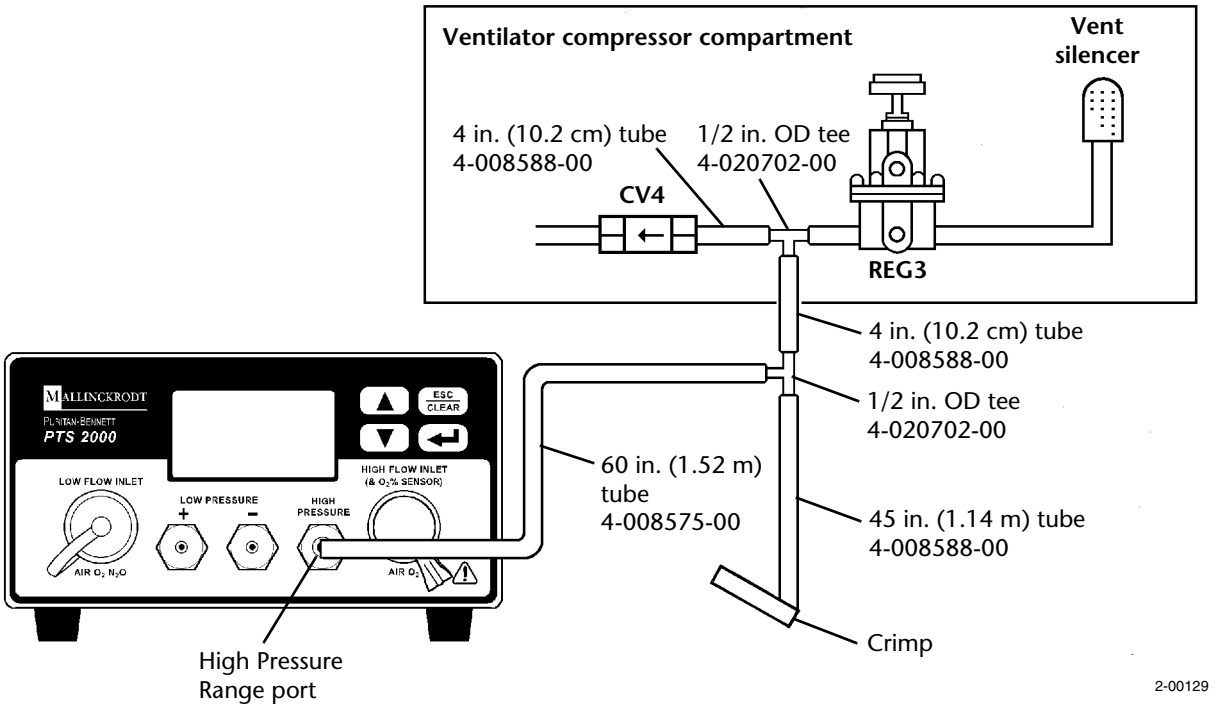


Figure 16-5. PS3/REG3 Test Setup

16.9.2 Removal/Installation

Remove the compressor pressure switch (PS3) as follows, referring to Figure 16-2.

1. Remove REG3 assembly by following steps 1 through 4 in Section 16.8.2.
2. Unscrew elbow with PS3 attached from REG3.
3. Unscrew elbow from PS3.

Install by reversing removal procedures, using Teflon tape on threaded pneumatic connections to prevent air leakage. Before returning ventilator to use, adjust REG3 (Section 16.8.3).

16.10 Compressor Unloading Solenoid (SOL9)

The compressor unloading solenoid (SOL9) relieves system back pressure to ensure that the compressor does not draw excessive starting current. Remove SOL9 as follows, referring to Figure 16-2.

1. Remove REG3 assembly by following steps 1 through 4 in Section 16.8.2.
2. Remove SOL9 by unscrewing SOL9 from nipple on REG3.

Install by reversing removal procedures, using Teflon tape on threaded pneumatic connections to prevent air leakage.

16.11 Compressor Inlet Silencer

The compressor inlet silencer quiets the inlet side of the compressor. Remove the inlet silencer as follows, referring to Figure 16-2. Install by reversing removal procedures.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Disconnect flex tube from inlet silencer.
3. Disconnect extruded tubing from inlet silencer.
4. Remove inlet silencer and bracket by removing two screws and washers.
5. Separate inlet silencer from bracket by removing screw and washer.

16.12 Compressor Outlet Filter (F6)

The compressor outlet filter (F6) removes small particles of debris and carbon dust from the compressor output. Replace F6 every 10,000 hours of compressor operation; it is included in the 10,000-hour preventive maintenance kit. Remove F6 as follows, referring to Figure 16-2.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Disconnect elbow and cut cable strap from top of F6.
3. Remove F6 and bracket by removing nut and washer.
4. Cut cable strap and remove elbow from bottom of F6.
5. Separate F6 and outlet filter gasket from bracket.

Install by reversing removal procedures, making sure arrow on F6 points down to the bottom of the unit. Use new cable straps to secure F6 to the elbows.

16.13 Compressor Compartment Fan (Attached to Divider)

The compressor compartment fan (attached to compressor compartment divider) pulls ambient air into the upper compressor compartment and dissipates heat in the compressor compartment. Replace the fan every 10,000 hours of compressor operation; it is included in the 10,000-hour preventive maintenance kit.

16.13.1 Removal/Installation

Remove the fan as follows, referring to Figure 16-6.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Remove inlet silencer (Section 16.11).
3. Remove F6 (Section 16.12).
4. Remove four screws and lockwashers that retain fan.
5. Disconnect fan cord from fan. Remove fan.

Install fan by reversing removal procedures, making sure that flow arrow points down and fan cord plug is to pedestal left rear.

16.13.2 Inspection

Replace fan if visibly damaged. To test fan, apply appropriate voltage, check for proper operation and noise level, and replace if necessary. Check the fan cord connector for proper contact on the fan assembly prongs. Pry the prongs slightly apart should the fan connector be too loose.

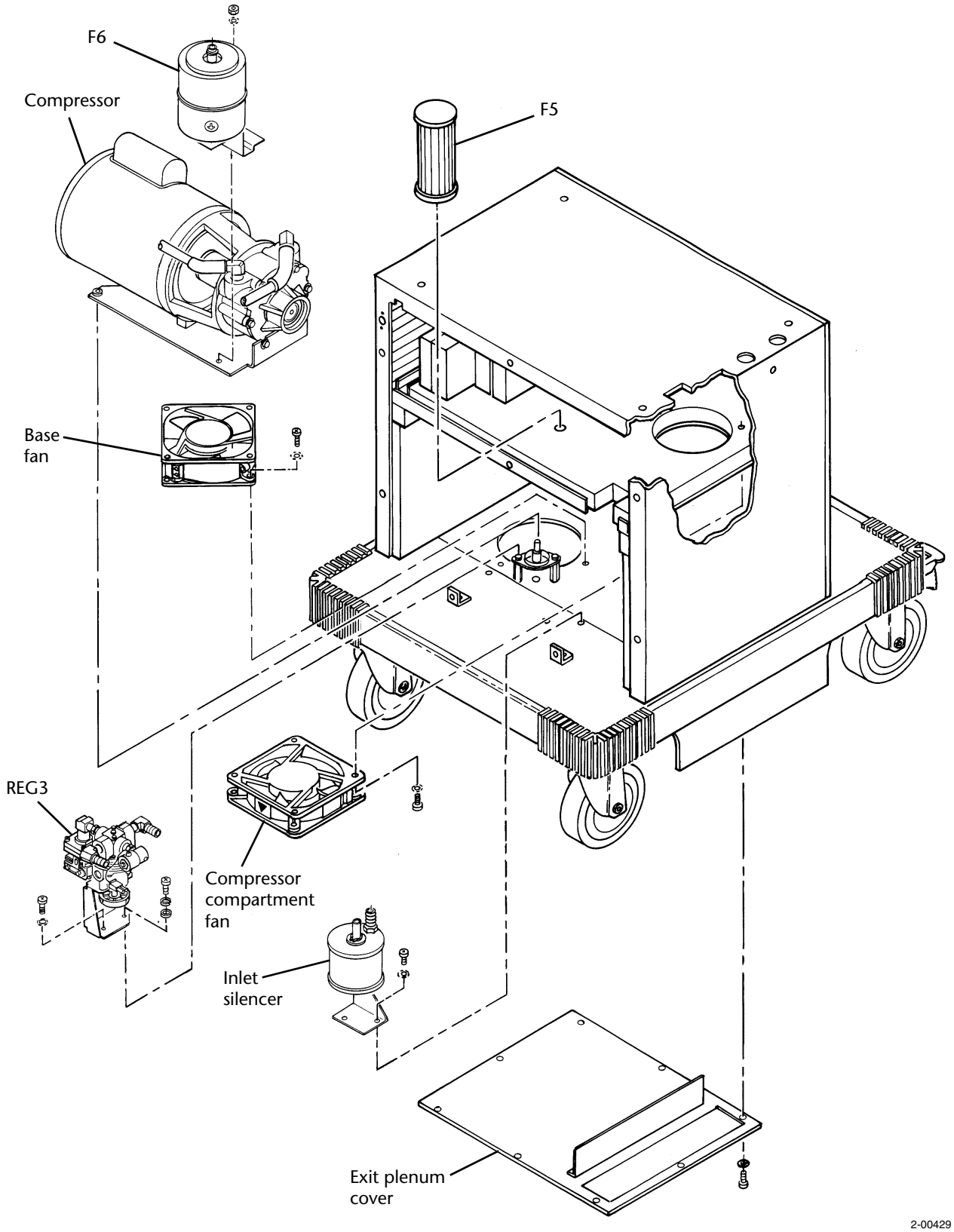


Figure 16-6. Removing Compressor and Fans

16.14 Compressor and Shock Mounts

The compressor consists of an electric motor and a rotary-vane oil-less compressor. The compressor supplies the ventilator with a flow of 120 minimum lpm at nominal 10 psi (68.95 kPa). The compressor can either provide the main source of compressed air or act as a back-up if wall air is lost. Replace the compressor every 10,000 hours of operation; it is included in the 10,000-hour preventive maintenance kit.

16.14.1 Testing

Test the compressor as described in Section 7.6.10, steps 14 through 26.

16.14.2 Removal

Remove the compressor as follows, referring to Figure 16-6.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Remove F5 (Section 16.3), REG3 assembly (Section 16.8.2, steps 1 through 4), inlet silencer (Section 16.11), and F6 (Section 16.12).

NOTE:

To gain access to the compressor, you (with someone else's assistance) may want to carefully tip the ventilator over until it rests on its front rail. Use padding on the floor to prevent damaging the rail.

1. Remove exit plenum cover (Section 16.20).
2. Disconnect tubing from compressor ports, and fold tubing into upper compressor compartment so that compressor is accessible.
3. From underneath pedestal, remove four screws, four washers, and four lockwashers, and pull out right end of compressor (as viewed from rear) to expose compressor end plate.
4. Loosen two screws on compressor end plate, and rotate end plate to expose wiring connections. Disconnect wiring from compressor. Remove compressor.
5. Remove shock mounts by removing two screws and two washers apiece from top, and two screws and washers apiece from bottom. Remove shims and standoffs.

16.14.3 Installation

Install the compressor and shock mounts by reversing removal procedures, making sure to connect the brown (hot) wire to terminal 1 of the compressor and blue (neutral) wire to terminal 4. These terminals may be in different locations on your new and old compressors (see Figure 16-7).

NOTE:

- Install the compressor-mounting screws and washers at the same time you install the shock mounts. Once the shock mounts are in place and screws tight, you will be unable to install the compressor-mounting hardware.
- Replace the elapsed time meter (Section 16.7) whenever you replace the compressor.

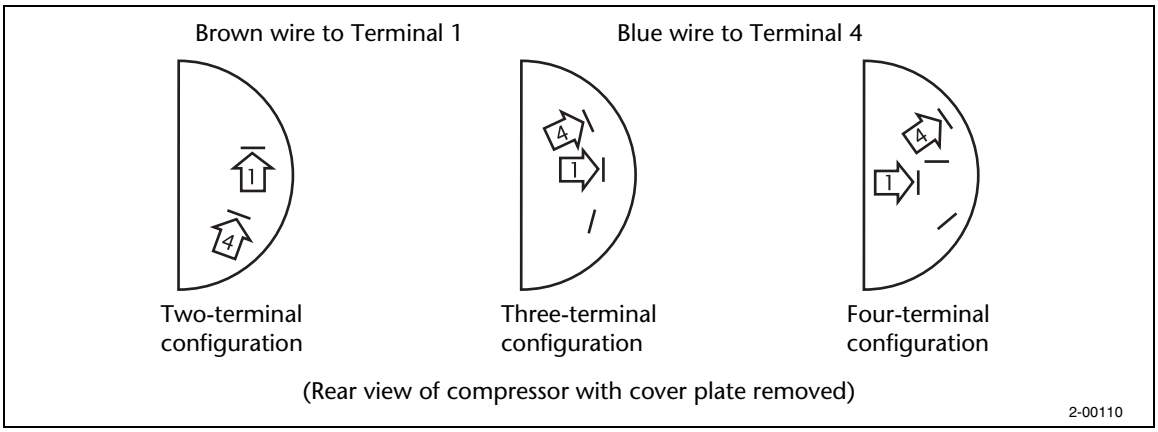


Figure 16-7. Compressor Terminal Configurations

16.15 Compressor Pedestal Base Fan (100, 220, and 240 V ac Units Only)

The compressor pedestal base fan, located below the compressor, dissipates heat generated by the compressor by blowing air out of the ventilator through the exit plenum. This fan is not included in 115 V units. Replace the fan every 10,000 hours of compressor operation; it is included in the 10,000-hour preventive maintenance kit.

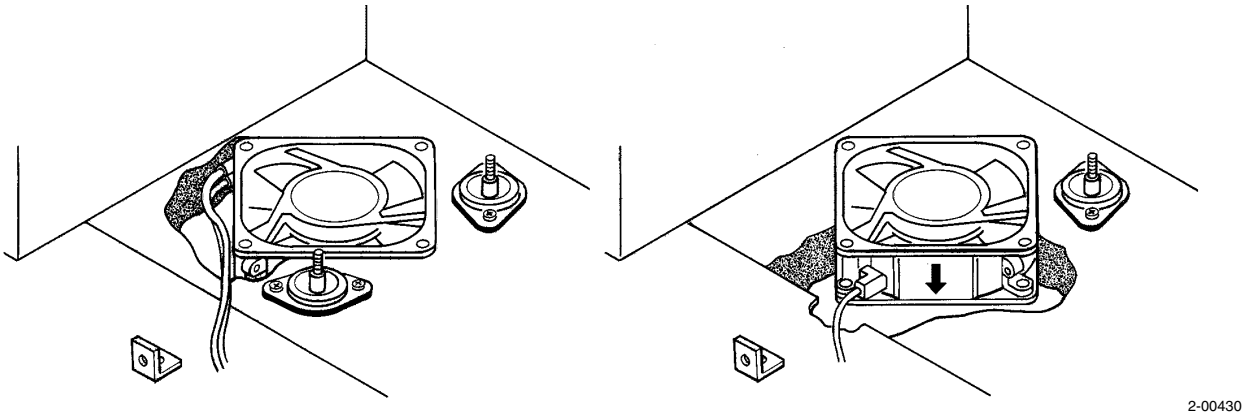
16.15.1 Removal/Installation

Remove the pedestal base fan as follows, referring to Figure 16-6. Install by reversing removal procedures, making sure arrow on fan is pointing down and fan cord is properly oriented (Figure 16-8).

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Remove compressor (Section 16.14).
3. Disconnect fan cord.
4. Remove fan by removing four screws and washers.
5. Clean or replace compressor pedestal base fan as applicable.

16.15.2 Inspection

Replace fan if visibly damaged. To test fan, apply appropriate voltage, check for proper operation and noise level, and replace if necessary. Check the fan cord connector for proper contact on the fan assembly prongs. Pry the prongs slightly apart if the fan connector is too loose.



Fan with Brown and Blue Wires **Fan with Black Cord**

Figure 16-8. Orienting Base Fan Cord

16.16 Heat Exchanger

The heat exchanger cools the compressed air before it reaches the ventilator. It is located in the upper compressor compartment. Remove the heat exchanger as follows, referring to Figure 16-2. Install by reversing removal procedures.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Remove inlet filter (F5) (Section 16.3).
3. Remove heat exchanger (with check valve and plastic tee still attached) by detaching extruded tubing at three places.
4. Separate heat exchanger from check valve/plastic tee assembly by loosening nut on tee.
5. Check for air leaks by attaching heat exchanger to dry compressed air. If no leaks are present, heat exchanger replacement is not required. If needed, clean heat exchanger with mild detergent and water.
6. If leaks are present, replace heat exchanger.

16.17 Compressor Check Valve (CV4)

The compressor check valve CV4 permits gas flow towards the ventilator only. If an external compressed air source is being used, the valve prevents this air from entering the compressor and being vented to atmosphere. CV4 is located in the upper compressor compartment.

Remove CV4 as follows, referring to Figure 16-2. Install by reversing removal procedures, making sure arrow on CV4 points away from the heat exchanger. Be sure to replace any Teflon tape on threaded pneumatic connections.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Remove heat exchanger (Section 16.16).
3. Remove CV4 from brass connector and brass tee by loosening nut on tee.
4. Clean the inside of CV4 with clean, dry compressed air. Wipe the outside of CV4 with a soft, dry cloth.
5. Attach CV4 to a source of clean, dry compressed air and check for leaks and adequate air flow.

16.18 Pedestal Base Assembly

The compressor pedestal base assembly is an integral part of the compressor pedestal and is equipped with protective bumpers, four casters, a heat dissipating fan, an air exit plenum, and a sound absorbing lining. The removal, repair, and replacement of the pedestal base components are as follows.

16.19 Casters

Front casters have brakes, while rear casters do not. Remove casters as follows, referring to Figure 16-9. Install by reversing removal procedures, being sure to install casters with brakes at front of pedestal.

NOTE:
To gain access to the casters, you may want to carefully tip the ventilator over until it rests on its front rail. Use padding on the floor to prevent damaging the rail.

1. Position pedestal so that casters are accessible.
2. Remove each caster by removing four screws, four lockwashers, and four flat washers.

NOTE:

If you are installing new casters and the existing casters have side-mounted brakes, you must install a caster upgrade kit (P/N 4-018255-00). The caster kit includes mounting plates, which are required when converting from the earlier caster style.

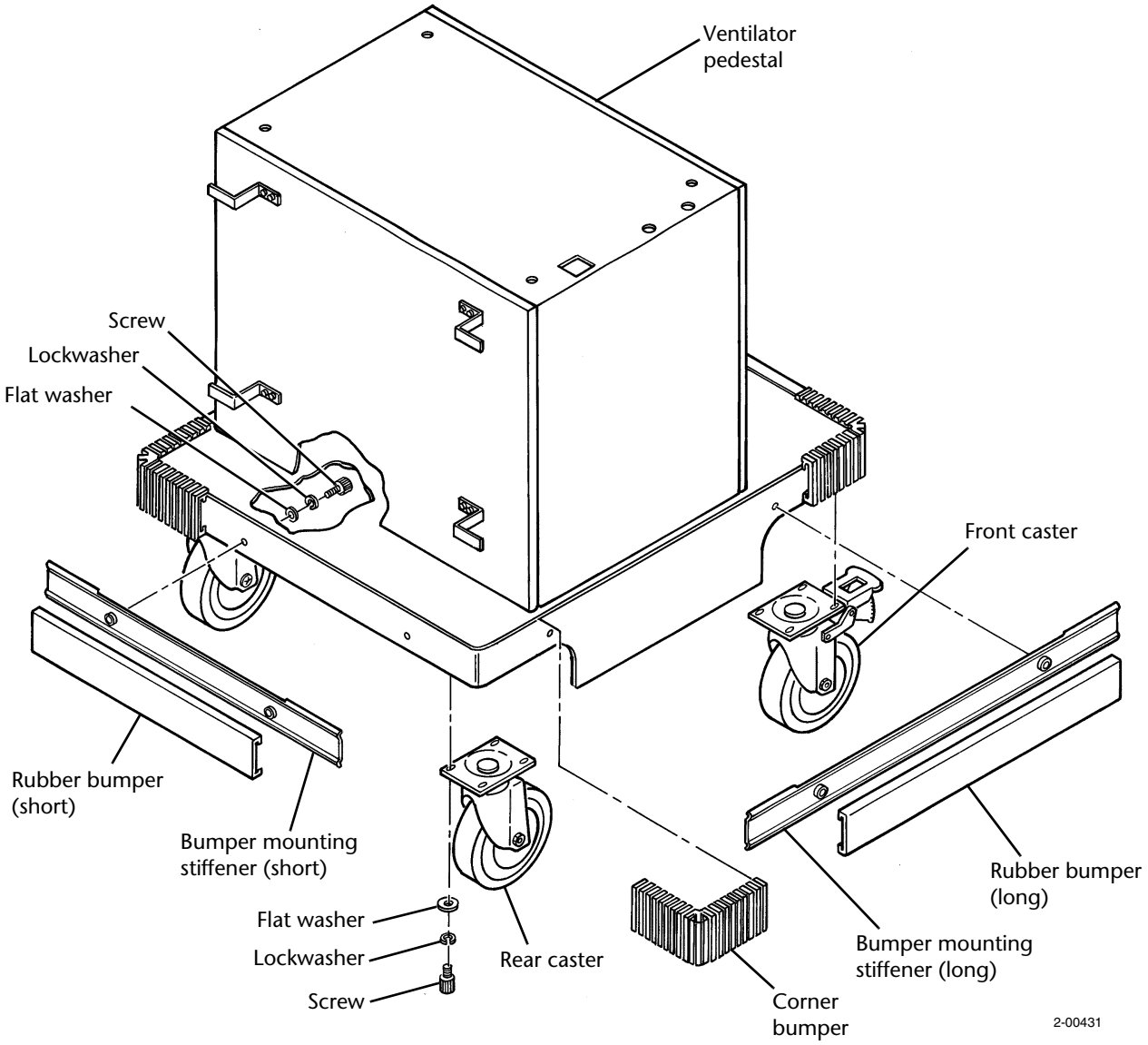


Figure 16-9. Compressor Pedestal Base Assembly

16.20 Exit Plenum Cover

Remove exit plenum cover as follows, referring to Figure 16-6. Install by reversing removal procedures.

NOTE:
To gain access to the exit plenum cover, you may want to carefully tip the ventilator over until it rests on its front rail. Use padding on the floor to prevent damaging the rail.

1. Remove exit plenum cover by removing eight screws and eight washers.
2. Repair, repaint (Section 8), or replace exit plenum cover, as applicable.

16.21 Bumpers

Remove the multipiece (later versions) or one-piece bumpers (earlier versions) from the ventilator pedestal base as follows. Install the bumpers to the ventilator pedestal base by reversing the removal procedures.

NOTE:
To gain access to the bumpers, you may want to carefully tip the ventilator over until it rests on its front rail. Use padding on the floor to prevent damaging the rail.

16.21.1 Multipiece Style with Ribbed Corners

1. Remove two long and two short bumper mounting stiffeners by removing eight screws, eight lockwashers, and eight washers (Figure 16-9).
2. Slide two long bumpers, two short bumpers, and four corner bumpers off mounting stiffeners.

NOTE:
When installing the bumpers, make sure the rounded edges of the bumpers and corners are at the top. Make sure the weldnuts on each stiffener are toward the bottom and facing toward the bumper.

16.21.2 One-Piece Style

1. Remove two long and two short bumper mounting stiffeners by removing eight screws, eight lockwashers, and eight washers.
2. Slide one-piece bumper off mounting stiffeners.

16.22 Removal/Installation of Compressor Pedestal Assembly

Warning

Set the brakes on both front casters to prevent movement of the ventilator during removal and installation of the compressor pedestal assembly. Do not attempt to push or move the ventilator if the brakes are set.

Separate the compressor pedestal assembly from the ventilator as follows. Reattach the compressor pedestal assembly to the ventilator by reversing removal procedures.

1. Remove pedestal access panel cover and inner access panel (Section 16.1).
2. Remove ventilator top and back panels (Section 19.1 through 19.2), and swing open left-hand panel (Section 9.1, steps 2 through 4).
3. Detach tube from elbow at top of tee on air regulator assembly (Figure 16-1). Push tube completely into compressor compartment.
4. Remove vent silencer and air silencer fitting from tube (Figure 16-1), then push tube completely into compressor compartment.
5. Disconnect compressor harness from utility panel harness, then push utility harness completely into ventilator.
6. Remove ventilator from compressor pedestal by removing four bolts and four washers and by lifting ventilator off compressor pedestal.